

REMARKS

This amendment responds to the Office Action mailed on December 22, 2004. Filed concurrently herewith is a *Request for a Three Month Extension of Time* which extends the shortened statutory period for response to expire on June 22, 2005. Accordingly, Applicant respectfully submits that this response is being timely filed.

Claims 1-15 were pending. By the above amendments, Applicants have amended the specification and claims corresponding to rejections in the Office Action and to correct minor informalities not affecting the scope of the claims. Claims 1-15 remain pending in the present application, and Applicants believe these claims are in proper condition for allowance for the reasons set forth below.

Priority

The specification has been amended above to reference that the present application is a continuation of pending PCT Application No. PCT/GB00/01439, filed April 26, 2000, which is incorporated by reference in its entirety herein, and claims priority to U.S. Provisional Patent Application No. 60/135,106 filed on April 27, 1999, which is incorporated by reference in its entirety herein, and claims priority to UK Patent Application No. (GB) 9909615.8, filed April 27, 1999, now issued as UK Patent No. GB 2349486A, which is incorporated by reference in its entirety herein. A copy of the certified priority document for (GB) 9909615.8 is also submitted herewith.

The present application claims priority to GB Patent Application No. 9909615.8 filed April 27, 1999, where the present application is also a continuation of PCT Application No. PCT/GB00/01439 as its U.S. national stage application. Thus, the effective priority date of the present '970 application is the April 27, 1999 filing date of GB Patent Application No. 9909615.8. As can be seen from the copy of the certified priority document for GB Patent Application No. 9909615.8 submitted concurrently herewith, the disclosure in the specification of the present application is identical to and fully supported by GB Patent Application No. 9909615.8. Hence, the present application has an effective priority date of April 27, 1999.

Drawing Objections

The Office Action objects to Figure 4 as failing to comply with 37 CFR 1.84(o) as failing to include certain functional labels mentioned in the description. However, the Office Action fails to identify any specific functional labels mentioned in the description that are not included in Figure 4. Applicants note that the paragraph beginning on line 28 of page 10 mentions the following reference signs: subject code 10, basic block 100, emulator 20, translated block 300 and target code 30. Each of these elements are clearly illustrated in Figure 4. Meanwhile, target processor 31 is illustrated in Figure 2. Thus, Applicants respectfully submit that Figure 4 contains all of the functional labels or legends related to reference signs mentioned in the specification. Reconsideration of the objection to claim 4 is respectfully requested.

Claim Rejections Under 35 U.S.C. §112, Second Paragraph

The Office Action rejects claims 1 and 14 under 35 U.S.C. § 112, second paragraph, as being indefinite for lacking antecedent basis for the limitation “the content of ... locations” in step (b). By the above amendments, claims 1 and 14 have been amended to overcome the § 112 rejections. Applicants respectfully submit that claims 1 and 14 as amended above now particularly point out and distinctly claim the subject matter which Applicants regard as their invention. Accordingly, Applicants requests withdrawal of the § 112 rejections of these claims.

Claim Rejections Under 35 U.S.C. §103

The Office Action rejects claims 1-15 under U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,199,152 to Kelly et al. (hereinafter “Kelly”) in view of U.S. Patent Application Publication Nos. 2003/0159134 A1, 2004/0205733 A1 and 2004/0210880 to Souloglou et al. (hereinafter “Souloglou publications”) Applicants respectfully traverse this rejection and request reconsideration based on the following remarks.

Claims 1-15 are respectively directed to a method of representing a subject register in an emulator in which an abstract register representing a subject register is alternatively mapped between two locations within a target machine, where one of the locations represents a definitive version of the abstract register for use by the emulator during exception handling, while the other

location represents a speculative version of the abstract register. Applicants note that it is recognized in the Office Action that Kelly fails to teach or suggest “an abstract register” as claimed, where the Souloglou publications are relied upon in the Office Action for disclosing a plurality of abstract registers used for code conversion and for dynamic binary translation in emulation in rejecting independent claims 1, 12, 13, 14 and 15. The Souloglou publications are further cited as disclosing other features of Applicants’ claims that the Office Action asserts are not disclosed in the Kelly reference. Namely, the Souloglou publications are cited as disclosing the features of dependent claims 2, 3 and 5.

The Souloglou Publications Are Not Prior Art

As set forth above, the present application claims priority to UK Patent Application (GB) 9909615.8 and has an effective priority date of the April 27, 1999 filing date of this UK application. The present application also claims priority to U.S. Provisional Patent Application Serial No. 60/135,106, filed on April 27, 1999. It can be seen from the copy of the certified priority document submitted concurrently herewith that UK Patent Application (GB) 9909615.8 fully supports the claims in the present application. At the time of their filings, UK Patent Application (GB) 9909615.8 and U.S. Provisional Patent Application Serial No. 60/135,106 were assigned to the same common assignee as the Souloglou publications, namely “Victoria University of Manchester.” Victoria University of Manchester subsequently simultaneously assigned the present application along with the Souloglou publications to the present assignee.

35 U.S.C. § 103(c) states:

(c) Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

According to 35 U.S.C. § 103(c), the Souloglou publications are not prior art to the present application, because the claimed invention and the subject matter of the Souloglou publications were owned by the same entity at the time the invention was made. Thus, the Souloglou publications are not prior art to the present application and all rejections in the Office

Action relying upon the teachings the Souloglou publications should be removed. Accordingly, none of the cited prior art alone or in combination teaches or suggests Applicants' claimed method of representing a subject register in an emulator in claims 1-15, and Applicants respectfully submit that the rejection of claims 1-15 should be withdrawn.

Kelly Discloses Using the Same "Working" Registers To Always Contain the Speculative Version of the Abstract Register

Claims 1-15 are respectively directed to a method of representing a subject register in an emulator in which an abstract register representing a subject register is alternatively mapped between two locations within a target machine, where one of the locations represents a definitive version of the abstract register for use by the emulator during exception handling, while the other location represents a speculative version of the abstract register. When an exception is encountered, exceptions are handled by recovering the conditions of the subject machine upon entry into the section of subject code using the definitive version of each abstract register. The function of the pair of locations is alternated between representing the definitive version and the speculative version upon successful completion of each section of subject code. Applicants' method is advantageous in that a definitive version of each register is always available for exception handling whilst avoiding time consuming copy and storing operations.

To the contrary, Kelly discloses an emulator which requires the time consuming copy and storing operations which Applicants' method avoids. Applicants note that they have described Kelly's emulator on page 5, lines 13-29 in the background section of the present application, where both U.S. Patent No. 6,199,152 and 5,832,205 possess substantially identical specifications. Kelly uses a set of "working" registers during emulation of each section of subject code. If a set of translated host instructions is executed without generating an exception, then the "working" register values determined at the end of the set of instructions are copied to the "official" registers. *See column 17, lines 5-10.*

Kelly further teaches that, if a target exception is generated during the running of any translated instructions, the values retained in the "official" registers are copied into the "working" registers in an operation referred to as "rollback." *See column 17, lines 60-67.* From this, it can be seen that Kelly teaches that its "working" registers are always the working copy of the registers and never the official copy of the registers and that the "official" registers always contain the official copy of the registers and never the working copy. Even when encountering

an exception, Kelly teaches copying the contents of the “official” registers back into the “working” registers so that “working” registers remain the working copy of the registers.

The use of “working” registers and “official” registers adds significantly to the overhead of the emulation process in the target processor due to the copying of information from the “working” registers to the corresponding “official” registers at the end of each section of subject code and also due to the copying of information from the “official” registers back to the corresponding “working” registers when an exception is encountered. Applicants recite on the paragraph bridging pages 5-6 of the present specification that it is an aim of their present invention to provide a method of representing subject registers in an emulator which allows exceptions to be accurately handled without the overhead of time consuming copy and storing operations similar to those required by the emulator of Kelly.

Kelly Fails to Disclose Alternating Mapping Between Two Locations Within The Target Machine

Applicants’ method avoids the above-described overhead associated with Kelly’s emulator by alternating mapping of the abstract register between first and second locations (e.g., registers or memory) within a target machine such that the first and second locations each alternate between representing a definitive version of the abstract register and the speculative version of the abstract register. When one of the locations represents the definitive version of the abstract register for a section of subject code, the other location will represent the speculative version. Applicants’ method then alternates mapping of the abstract register, such that the same location that was previously mapped to represent the definitive version of the abstract register will subsequently be mapped to represent the speculative version of the abstract register. At the end of each section of code, the definition of these two locations within the target machine are reversed such that each location respectively performs the opposite function during the next section of code. Alternating the function of the two locations representing each abstract register provides a simple and elegant method of maintaining the entry condition for the current section of code, and it is not necessary to update the status of every abstract register upon successful completion of each section of code, as described on page 13, lines 11-25 of the present specification.

As described above, Kelly's "working" registers always contain the working (i.e., speculative) copy of the registers while the "official" registers always contain the official (i.e., definitive) copy of the registers. Kelly fails to teach or suggest alternating the function of the "working" and "official" registers. With this relationship, Kelly requires the status of every abstract register to be updated upon completion of each section code.

Accordingly, the Office Action fails to establish a *prima facie* case of obviousness in setting forth the present rejection.

According to the Manual of Patent Examining Procedure § 2142:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Applicants respectfully submit that the requirements for establishing an obviousness rejection have not been met. First, the prior art reference must teach or suggest all the limitations of the claims. See *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970). Here, Kelly fails to teach or suggest alternating the mapping of the abstract register between the first and second locations of the target machine such that the first and second locations alternative between respectively representing the definitive and speculative versions of the abstract register. Further, as set forth above, Kelly fails to teach or suggest the "abstract registers" as claimed and the Souloglou publications are not prior art to the present application. Accordingly, Applicants respectfully submit that a *prima facie* case of obviousness cannot be maintained and the rejection of claims 1-15 should be withdrawn.


Conclusion

In view of the foregoing remarks and amendments, Applicants respectfully submit that the subject application is in condition for allowance. Applicants, therefore, respectfully request reconsideration and early notice of allowance.

Respectfully submitted,

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